National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

Flight & Ground Software Division

Organizational Training Plan

Document Approval

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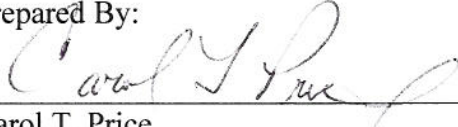Chief, Flight & Ground Software Division/ES50

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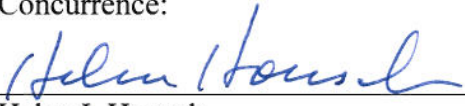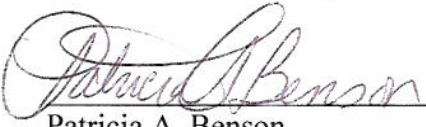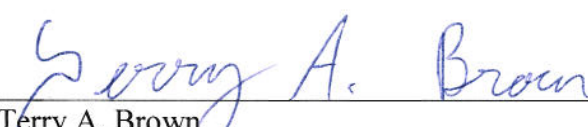**APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.**

Document History Log

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		12 Dec 01	Baseline Release
Revision	A	29 May 02	Pre-Assessment activity updates
Revision	B	9 May 03	Level 3 CMM activity updates
Revision	C	9 Nov 04	Editorial update to clarify requirements language in response to Headquarters Rules Review Action. Update to QD org code. Update of headers, footers, export control language, and History Log (SPI SCR 21). Editorial update due to 10/04 center re-organization (SPI SCR 88). Document number change to adhere to SRB document numbering procedure (SPI SCR 88).
Revision	D	12 Oct 05	Modified document to satisfy CMMI requirements. Updated the headers and footers to comply with new EI32 Generic Template. The following SCR was addressed in this revision: SPI SCR (106)
Revision	E	24 Jul 07	To comply with CMMI level 2 and 3 requirements. Modified the signature page and the document footer. Add In-house training. Updated the relevant stakeholders table.
Revision	F	17 Feb 09	Placed document in latest template. Updates associated with annual review. Updated FY Training matrix. Replaced "FSB" with "organization," as needed. Updated signature page to add all branch chiefs and the division chief. Added Appendix B, Training Requirement Plan. Deleted Section 10.0 MSFC Training Organization. Added Table II, Organizational Specific Training. Implement SA SCR #143, Training Plan needs updating.

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1.0 SCOPE

The Flight and Ground Software Division Organizational Training Plan describes the approach to develop skills and knowledge of individuals in order to:

- Expand the core expertise of the group to implement and test in-house software projects
- Provide skills necessary for technical engineering management of contractor-provided software projects
- Improve existing software processes
- Maintain a safe work environment
- Train personnel for management roles within the department
- Develop the professional excellence of employees to perform their roles more effectively and efficiently.

Training is an organizational and employee responsibility. The software projects are responsible for identifying their needed skills and providing the necessary training when the project's needs are unique. A training needs assessment is conducted (on an as needed basis) to assess both organizational and project training needs.

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2.0 PURPOSE

The purpose of this training plan is to identify the key objectives of training for the organization and to gain consensus on the approach to accomplishing training needed to meet the division's training objectives. In addition, this plan ensures that the organization has the necessary skills and expertise to perform or support the life cycle processes.

2.1 Personnel Categories

This training plan applies to all employees who reside within the following categories of organization personnel:

Senior Management – The Division Chief is responsible for software-dependent projects. This category may also include Branch Chiefs and Technical Assistants.

Project Lead - The person ultimately responsible for the delivery of technically compliant work products within the resource and schedule constraints established in a software development plan. The project lead is an experienced practitioner and directs the work of product engineering teams as well as that of support staff engaged in planning, monitoring, configuration management, and quality assurance activities. The project lead is delegated authority from senior management to make the required decisions and to deliver products of high quality using the organization's approved processes.

Team Lead - The first-line manager of product engineering activity who manages a group of software/hardware practitioners. The team lead is an experienced software/hardware practitioner and is assigned responsibility to plan and direct the work of team members in all phases of a project's life cycle, following standard processes developed for use on the project. The team lead takes direction from senior management.

Engineer – The programmer, analyst, tester, system, software, or hardware engineer working as an individual contributor on any phase of a project's life cycle. The practitioner is primarily responsible for developing the work products associated with product engineering and takes direction from a team lead or project lead.

Technical Specialist – Technical support staff member such as SEPG, metrics analyst, configuration management, Safety and Mission Assurance (S&MA), or person responsible for process improvement for the organization or project. The technical specialist's activity may be directed by the project lead, team lead, or by senior management, as appropriate.

3.0 TRAINING COURSE LISTING

The following is used as a reference for available courses and providers:

- MSFC Employee & Organizational Development Department

- NASA Academy of Program and Project Leadership

- The NASA Software Training Course Listing, NASA-TM-209370, a product of the NASA Software Working Group

- System for Administration, Training and Educational Resources for NASA (SATERN) online course catalog
- Specialized training provided by commercial vendors.

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4.0 RESPONSIBILITY FOR THE PLAN

4.1 Management Ownership

The Division and Branch Chiefs perform the following functions:

- Review and approve this training plan
- Identify training requirements for organization members
- Review training activities on a periodic basis for adequacy, appropriateness, and timeliness
- Review successfully completed training during performance reviews
- Review employee feedback from training courses
- Locate sources of training for unique engineering and management training as necessary
- Waive training for those employees who are qualified to have certain training waived
- Review and approve employee Individual Development Plans (IDP)
- Coordinate training with the MSFC Training Organization.

4.2 Authorship and Revision Ownership

4.2.1 Software Engineering Process Group (SEPG)

The organization's SEPG performs the following functions:

- Prepare and maintain this training plan
- Review and update this plan as necessary based on updated training requirements or strategy
- Maintain this Plan in the organization's Process Asset Library (PAL)
- Update and maintain the organization's training database (including project training).

4.2.2 MSFC Training Organization

The MSFC Training Organization performs the following functions:

- Receive training needs assessment via the IDP
- Provide facilities, scheduling, announcements, and record keeping of selected training courses
- Schedule, organize and coordinate training.

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5.0 TRAINING STAKEHOLDERS

The Table I is a list of relevant stakeholders of the organizational training program:

Table I Relevant Stakeholder Roles and Responsibilities

Relevant Stakeholders	Roles & Responsibilities
Internal	
Senior Management: Division and Branch Chiefs	Approve and commit to training planning estimates and periodically review training for project activities.
Project Leads	Responsible for gathering training requirements for project assigned.
Team Leads	Identify training requirements to the project lead on an annual basis or as requested by the Branch Chief. Identify additional training requirements to Branch Chief as necessary. Attend requested training. Provide feedback from training courses to Branch Chief. Discuss successfully completed and future training during performance reviews. (Civil service only) Complete and maintain an IDP (Civil service only)
Engineers	Identify training requirements to the project lead on an annual basis or as requested by the Branch Chief. Identify additional training requirements to Branch Chief as necessary. Attend requested training. Provide feedback from training courses to Branch Chief. Discuss successfully completed and future training during performance reviews. (Civil service only) Complete and maintain an IDP (Civil service only)
Technical Specialist: Metrics Analyst	Collects, maintains, and reports measurement data on the training process.
Technical Specialist: SEPG	Technical support staff that facilitate the definition, maintenance and improvement of the training program used by the organization as well as collects, maintains and reports training data. Provide in-house organizational process training.
External	
MSFC Training Organization (CD20)	Schedule and provide external training to the organization.
Safety & Mission Assurance (S&MA)	Objectively evaluates process/product compliance.

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6.0 TRAINING DEVELOPMENT

The organization consistently provides its employees with the facilities, tools, and professional development opportunities needed to effectively meet our customers' needs while enhancing the critical core competencies of its workforce.

6.1 Organizational Training Goals

The following is a list of organizational training goals:
- Maintain technical competence
- Instill systems engineering principals in the software life-cycle process
- Instill working knowledge of the organization's software development process and practices
- Develop professional management skills

We also use a wide variety of training techniques including:
- Mentoring
- On-the-Job Training
- Course-work
- Full-Time Study
- Conference attendance
- Involvement in professional societies
- Lead sub-committees
- Guided Self-Study
- Write papers
- Use of Individual Development Plans
- Maintain project communication
- Organizational development

Employees receive center mandated training that is tracked by the Center:
- Ethics training
- SHE training
- ISO9001 training
- Property Responsibility training
- IT Security training
- Sensitive But Unclassified (SBU) training

The goal of the organization is to have each employee attend a minimum of 20 hours of training per year. Refresher training is provided as significant changes are made to training requirements and/or processes, as defined by the SEPG. Appendix B lists planned FY09 organizational training.

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7.0 PERSONNEL RESPONSIBLITY

The personnel categories listed in Section 2.1 require training that supports the following skills and expertise, as needed.

Senior Management
- Lead and coordinate the organization's activities
- Support and provide monitoring of organizational training goals
- Conduct monitoring of software development and maintenance projects
- Establish, implement, and track software process improvement initiatives
- Understand the concepts covered in the Capability Maturity Model Integration and process improvement

Project Lead
- Support and provide monitoring of the organizational training goals
- Plan and manage a software development or maintenance project
- Understand the phases and components of the software life cycle
- Clarify and control the project technical needs, budget and schedule constraints, standards and guidelines, and customer expectation
- Plan for, estimate, and track project activities and risks
- Manage the quality and configuration of software, hardware and documentation
- Support the definition, documentation, and improvement of project software engineering processes
- Understand the structure and uses of the Capability Maturity Model Integration and process improvement
- Foster cooperation and teamwork among team members, customers, contractors, and senior management
- Guide the software project team in implementing appropriate technologies and improvements
- Understand the activities associated with software quality and safety

Team Lead
- Understand the phases and components of the software life cycle
- Direct the work of engineering teams and support staff engaged in project activities
- Understand the structure and uses of the Capability Maturity Model Integration and process improvement
- Lead and oversee adherence to project processes, standards, and improvement activities
- Ensure accuracy and quality of process, project, and product measurement data
- Understand the activities associated with software quality and safety

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Engineer
- Understand the phases and components of the software life cycle
- Understand the specific application and requirements of the project and the software architecture
- Understand the structure and uses of the Capability Maturity Model Integration and process improvement
- Understand the need for objectivity and diligence in reporting measurement information
- Implement relevant, approved software processes and improvement activities
- Understand the activities associated with software quality and safety

Technical Specialists

S&MA Representative
- Understand the phases and components of the software life cycle
- Understand the structure and uses of the Capability Maturity Model Integration and process improvement
- Implement relevant, approved software processes and improvement activities
- Understand the need for objectivity and diligence in reporting measurement information
- Understand the specific application and requirements of the project and the software architecture
- Understand the activities associated with software quality and safety

Configuration Management Lead
- Understand the phases and components of the software life cycle
- Understand the structure and uses of the Capability Maturity Model Integration and process improvement
- Implement relevant, approved software processes and improvement activities
- Understand the need for objectivity and diligence in reporting measurement information
- Understand the specific application and requirements of the project and the software architecture
- Understand the activities associated with software quality and safety

Metrics Analyst
- Understand the phases and components of the software life cycle
- Understand the structure and uses of the Capability Maturity Model Integration and process improvement
- Implement relevant, approved software processes and improvement activities as they relate to the measurement program
- Understand organizational objectives and MSFC metric reporting requirements

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Software Engineering Process Group

- Understand the phases and components of the software life cycle
- Understand the structure and uses of the Capability Maturity Model Integration and process improvement
- Implement relevant, approved software processes and improvement activities
- Understand the need for objectivity and diligence in reporting measurement information
- Understand the specific application and requirements of the project and the software architecture
- Understand the activities associated with software quality and safety

8.0 TRAINING POLICY

This document is in accordance with the organization's Training Policy documented in the Flight & Ground Software Policy, ES50-MEMO-001.

8.1 Training Implementation

The implementation of this plan is a collaborative effort between the Division, Engineering Directorate, S&MA and the MSFC Training Organization.

The annual MSFC training assessment and/or the employee's IDP serve as the primary means of identifying the training requirements. The Branch Chiefs provide inputs as required to the training needs assessment that identify the following:

- Performance/skill gaps
- Specific targeted audiences
- Suggested training available to satisfy the needs.

The Division is responsible for coordinating with the MSFC Training Organization to accomplish the following:

- Determine training course requirements
- Analyze needs on an annual basis
- Determine audience (job level, education, experience, and prerequisite knowledge)
- Identify constraints (resources, date required, and delivery environment)
- Coordinate with the MSFC Training Organization on the training facilities
- Coordinate with the MSFC Training Organization on the training instructor standards
- Set priorities for course training and for course attendance based on mission and Directorate goals.

The employee is responsible for:

- Registering for MSFC training courses
- Attending the courses for which he/she is registered
- Maintaining his/her IDP
- Attending a minimum of 20 hours of training per year
- Providing feedback to the Branch Chief concerning the usefulness of the training event
- Providing the data required to develop and maintain the organization's training metrics and matrices.

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Training internal to the organization (in-house training) such as process training and S&MA training is coordinated and/or developed by the SEPG. The organization's Training Database shows planned and actual training for both project and organizational personnel. Senior Management reviews course evaluation forms. The SEPG maintains records of internal training events for all employees, including contractors.

The MSFC Training Organization maintains records of personnel training for all training coordinated through the MSFC Training Organization.

8.2   Project Specific Training

Project-specific training is provided in the Software Development Plan (SDP) for that project. The information in the SDP addresses what technical areas are being taught and the classes that are required to be taken by the engineers on that project. The SDP references the individual project team member training that is recorded in the organization's Training Database which lists all planned training for that project.

8.3   Organization Specific Training

The ES50 Organizational Specific Training is documented in Table II below.

Table II Organization Specific Training

Organizational Training	Division Chief	Branch Chief	Project Lead/Technical Assistant	Team Lead	CM Lead	Metric Analyst	SEPG	Safety & Mission Assurance	Project Personnel	Organization Support
Internal Organizational Training										
Configuration Management		•	•	•	3	•	3	•	•	
Standard Process Definition	•	•	•	•	•	•	3	•	•	•
Data Management		•	•	•	•	•	3	•	•	
Metrics	•	•	•	•	•	3	3	•	•	
Risk Management	•	•	•	•	•	•	3	•	•	
Other Organizational Training										
TeamTrack [1]		•	•	•	•	•	•	•	•	
DataDrill						•	•			
Code Collaborator [2]		•	•	•	•	•	•	•	•	
Software Assurance Course [0]	•	•	•	•	•	•	•	•	•[1]	
Project Management Overview			•							
CMMI Executive Summary	•	•	•							
Introduction to CMMI [1]				•	•	•	•	•	•	

[0] SATERN course
[1] As specified by project management
[2] Peer review participants
[3] Waived

Note 1: Internal organizational training is required to follow the process indentified in the SDPDD section 7.9.3.1. Other organizational training only captures charts and attendance.

Note 2: The SEPG is waived from taking the organizational process training since they are all responsible for and involved in the development and maintenance of our organizational processes.

Note 3: DataDrill training will be administer to the SEPG by the Metric Analyst.

8.4 Training Waiver Process

An employee may have training waived for any required course by Senior Management based on the following criteria:

- Qualified work experience
- On-the-Job training experience
- Educational experience.

The waived training is recorded on the Training Requirements Plan, MSFC Form 4333 and noted in the Training Database. The records are maintained by the SEPG and stored in the PAL.

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9.0 TRAINING DEVELOPMENT

9.1 Internal Training

Internal training is developed and conducted in accordance with Organizational Work Instruction ORG-WI-003, *Internal Training Procedure*. The Internal Training Procedure is located in the PAL.

9.2 Internal Trainer Selection

Senior Management uses the following selection criteria to select in-house trainers.

- Knowledge of subject matter
- Previous training/work experience of subject

9.3 Internal Training Materials Minimum Content

Training material contains the following minimum content:

- Title page
- Intended Audience
- Training objectives
- Agenda items
- Course content
- Summary
- Contact or Reference Information.

9.4 Internal Training Evaluation and Description Forms

The Training Evaluation Form is used by senior management to assess the quality of training provided to employees. The Training Description Form is used by senior management to approve all in-house training provided to employees. The forms can be found on the PAL in the following location Srv1fsd\Ed-s1f\Process Asset Library (PAL)\Software Process and Reference Materials\Forms.

Appendix A.   Acronyms

Acronym	Definition
IDP	Individual Development Plan
MIDL	MSFC Integrated Document Library
MSFC	Marshall Space Flight Center
PAL	Process Asset Library
SATERN	System for Administration, Training and Educational Resources for NASA
SBU	Sensitive But Unclassified
SCR	Software Change Request
SDP	Software Development Plan
SEPG	Software Engineering Process Group
S&MA	Safety and Mission Assurance
SPI	Software Process Improvement

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Appendix B. MSFC FY09 Organizational Training

Office of Chief Engineer Funded

Course	Vendor	# of Days	Priority	FY09 Quarter
CMMI Appraisal SCAMPI B	Nupit	5	1	Q1
Appraisal Readiness Review	Nupit	1	4	Q3
SCAMPI Appraisal Team Training	Nupit	3	2	Q3
CMMI Appraisal SCAMPI A	Nupit	5	2	Q4
Understanding CMMI High Maturity Practices	SEI	4	3	TBD
Mastering Process Improvement	SEI	5	3	TBD
Defining Software Processes	SEI	4	4	TBD
Documenting Processes Effectively	SEI	4	4	TBD
Implementing Goal-Driven Measurement	SEI	3	2	TBD
Intro CMMI v1.2	CSM	3	1	Q1

Safety and Mission Assurance Funded

Course	Vendor	# of Days	Priority	FY09 Quarter
Software Safety for Practioners	M. Wetherholt	5	1	Q1
Formal Inspections	Shull, Fraunhofer	1.5	1	Q1

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Appendix C. Training Requirements Plan, MSFC Form 4333

TRAINING REQUIREMENTS PLAN

Name:	Organization Code:	Job Title:

Skills/Tasks Requiring Training:

TRAINING REQUIREMENTS

Training Description (OJT, Training Courses/Assignments, etc.)	Completion (Supervisor's Initials)	Date Completed

Employee's Signature:	Date:
Supervisor's Signature:	Date

MSFC Form 4333 (January 1998)   PDF